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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,604	11/21/2003	Zhili Hao	MEMS-0209-US	8216
7590	03/11/2005		EXAMINER	
KCO Law			LEUNG, RICHARD L	
P.O. Box 220472				
Chantilly, VA 20153-0472			ART UNIT	PAPER NUMBER

3744

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/717,604

Applicant(s)

HAO ET AL.

Examiner

Richard L. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 10 and 11 is/are withdrawn from consideration.
- 5) ☒ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-9,12,15-18 and 20 is/are rejected.
- 7) ☒ Claim(s) 5,13,14 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of claims 1-9 and 12-20 in the reply filed on 08 February 2005 is acknowledged.
2. Claims 10 and 11 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 08 February 2005.

### *Drawings*

3. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the current figures, particularly Figures 2A-C and 3C are too dark to permit all the details to be satisfactorily viewed. It is strongly suggested that new replacement figures without shading be submitted and, if possible, to replace any photographs (i.e. SEM images) with drawings. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be

removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 6, 8, 9, 12, 15-18, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5165243 (Bennett). Bennett discloses a miniaturized thermoacoustic refrigerator comprising a tapered resonant tube 18, an acoustic driver (acoustic engine) 12 and 14, which creates a standing wave in the resonant tube 18, and a stack 16 configured to transport thermal energy from a gas in the resonant tube 18, wherein the stack 16 has a first side and a second side, each positioned in a different position in the standing wave to create a thermal gradient between the first side and the second side. Attached to the first side is a first (hot) heat exchanger 28 and attached to the second side is a second (cold) heat exchanger 26. An electronic device

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22 to be cooled is coupled to one side of the stack 16 at cold heat exchanger 26 wherein the thermal gradient is established to transfer heat from the electronic device 22. It is understood that heat from the cooled device is transferred to the hot heat exchanger 28 via the stack 16. Bennett further discloses that stack 16 comprises a stack of parallel plates 38 (see column 6, lines 15-17 and Fig. 10), which is considered to be equivalent to a parallel array.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 7 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 5165243 (Bennett). As discussed above, Bennet discloses all the limitations of the claim except for expressly disclosing that the tapered resonant tube 18 is created using gray scale technology. This limitation, however, is drawn to a product-by-process and patentability is determined by the product itself and does not depend on its method of production. See MPEP §2113. Since the resonant tube 18 of Bennett is tapered (see Fig. 1), is capable of confining a standing wave in a thermoacoustic refrigerator, and otherwise appears to be structurally the same as the claimed resonant tube, claim 7 is not considered patentably distinct over Bennet. Furthermore, the method of gray scale etching is not considered to be critical to the resonant tube since Applicants admit on page 9 of the specification that,

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"Although gray scale etching was discussed...various other micro-machining and/or etching/fabrication techniques can be used in accordance with exemplary embodiments of the invention." Therefore to overcome this rejection Applicants must demonstrate evidence establishing an unobvious difference between the claimed product and the prior art product.

***Allowable Subject Matter***

8. Claims 5, 13, 14, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 2003/0223696 A1 (Salib et al.): discloses a method for fabricating a taper comprising the use of gray scale lithography.

US 6574968 B1 (Symko et al.): discloses a miniaturized thermoacoustic refrigerator.

US 6133670 (Rodgers et al.): discloses a comb drive actuator for use in microelectromechanical applications.

US 5914553 (Adams et al.): discloses a micromechanical resonator comprising a comb drive.

US 5901556 (Hofler): discloses an acoustic cooling engine comprising a tapered resonant tube.

US 5561984 (Godshalk et al.): discloses the application of micromechanical machining to construct elements of a thermoacoustic engine.

US 5456082 (Keolian et al.): discloses a pin stack array for thermoacoustic energy conversion.

US 5303555 (Chrysler et al.): discloses a thermoacoustic heat pump to cool electronic chips.

US 4948360 (Wells): discloses a tapered resonance tube.

US 4953366 (Swift et al.): discloses an acoustic cryocooler.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard L. Leung whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise L. Esquivel can be reached on 571-272-4808. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard L. Leung  
Examiner  
Art Unit 3744

rl

  
DENISE L. ESQUIVEL  
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